

Notice of Allowability

Application No.

10/069,345

Examiner

Henry S. Hu

Applicant(s)

IMANISHI ET AL.

Art Unit

1713

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to Pre-Amendment of 2-25-2002.
2. ☒ The allowed claim(s) is/are 1-8.
3. ☐ The drawings filed on _____ are accepted by the Examiner.
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date 4 pages
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____.
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in two telephone interviews with **Andrew D. Meikle (tel. 703 205-8000) on August 30 and September 2, 2004** to amend the following:

Specification

page 11 at line 17 replace the word of "cylindrical" with "cylindrical"

Claim

Claim 1 at line 2 Please replace the word of "comprising" with
"which comprises:"

Claim 1 at line 3 Please inset the phrase of “, disposing said copolymer in a closed apparatus,” between “said copolymer” and “and then reheating”

Claim 1 at line 3 Please replace the phrase of “a closed apparatus” with “said closed apparatus”

Claim 1 at lines 4 Please replace the phrase of “a non-static condition” with “non-static conditions”

Claim 1 at line 6 After the word of “materials” please add a sentence of “, wherein the content of volatile materials is expressed by a percentage of a weight loss of the polymer after heating the dried copolymer at 380°C under an absolute pressure of about 10 mmHg for 30 minutes based on the weight of the dried copolymer before heating”

DETAILED ACTION

2. Applicants' Pre-Amendment filed on February 25, 2002 was received. A cross reference was provided in specification, while Claims 4 and 6-8 were only amended to correct the improper multiple claim dependency.

The above examiner's amendment has corrected the improper language in specification and parent Claim 1 to use the right word of "cylindrical" in specification and to correct the improper and indefinite wording on Claim 1. **Claims 1-8** are pending now. An Action follows.

Allowable Subject Matter

3. Claims 1-8 allowed.

4. The following is an examiner's statement of reasons for allowance: The above claims are allowed over the closest references:

5. *The limitation of parent **Claim 1** in the present invention relates to **a method for stabilizing a melt-processable fluorine-containing copolymer comprising heating and melting said copolymer, disposing said copolymer in a closed apparatus, and then reheating said copolymer in said closed apparatus under non-static conditions**, whereby a content of volatile materials in the copolymer is reduced to **30 % or less** of an initial content of volatile materials, wherein the content of volatile materials is expressed by a percentage of a weight loss of the polymer after heating the dried copolymer at 380°C under an absolute pressure of about 10 mmHg for 30 minutes based on the weight of the dried copolymer before heating. See other limitations of dependent **Claims 2-8**.*

Art Unit: 1713

6. In a close examination, parent **Claim 1** of present invention carries the specific “method of stabilizing a melt-processable fluorine-containing copolymer” limitation by a combination of “heating and melting said copolymer, disposing said copolymer in a closed apparatus, and then reheating said copolymer in said closed apparatus under non-static conditions in a closed apparatus under a non-static condition”. As disclosed by the Applicants, the present application relates to a methodology to improve the thermal stability of a melt-processable fluorinated copolymer.

US Patent No. 4,420,449 to Crocker et al. only discloses a process for producing articles of PTFE by steps of intensively mixing and thermokinetically heating PTFE resin in an enclosed container (abstract, line 1-7; title). It can be heated up to about 370 °C. No content of volatile materials is disclosed. Therefore, Crocker does not teach or fairly disclose the repeat heating in a closed system or it can be applied to fluorinated copolymer.

US Patent No. 4,576,857 to Gannett et al. only discloses that **melt-fusible polyimides can be handled in the melt without deterious decomposition** (column 8, line 13-18 and 43-55). It can be heated up to 450 °C. However, Gannett does not teach or fairly disclose the repeat heating in a closed system or it can be applied to fluorinated copolymer.

7. **US Patent No. 4,578,455 to Pipper et al.** only discloses a process for removing volatile constituents from polymer melts or pastes by passing it with continuous formation of fresh surfaces and venting the volatiles with orifices (abstract, line 1-4; column 1, line 8-13 and 37-

Art Unit: 1713

41). Although the claimed **heating and melting is disclosed, no step of reheating is disclosed.**

Additionally, Pipper does not teach or fairly disclose to operate the heating-cooling process in a closed system or it can be applied to fluorinated copolymer.

WO Patent No. 98/09784 to Hiraga et al. only discloses a process for stabilizing melt-processable fluoropolymers by melt kneading with a kneader to preventing fluoropolymer from decoloring (abstract, line 1-5). It will remove some volatile constituents. Although the claimed **heating and melting is disclosed, no step of reheating is disclosed.** Additionally, Hiraga does not teach or fairly disclose to operate the heating-cooling process in a closed system.

JP Patent No. 50-115293 A with assignee of Daikin Industries only discloses a process for removing volatile constituents from tetrafluoroethylene-hexafluoropropylene copolymers by heating at 360-400 °C for less than 10 minutes and then keeping below its melting points but higher than 150 °C (title; abstract, line 1-5). A pole-free molded article can be thereby obtained. Although the claimed **heating and melting is disclosed, no step of reheating is disclosed.** Additionally, it does not teach or fairly disclose to operate the heating-cooling process in a closed system.

8. **US Patent No. 5,377,708 to Bergman et al.** only discloses an improved process of making semiconductor wafers and the like by using heat **to remove or volatilize** the by-products from the wafer so that a **low particle count performance** is obtained (abstract, line 16-20). It is noted that TEFLON or other suitable **fluoropolymer** is included in the heating system as the

inner bowl piece, bottom wall liner, plug and bellows (column 16, line 14-18; column 17, line 21-22). Although the claimed **heating and melting is disclosed, no step of reheating is disclosed**. Additionally, Bergman does not teach or fairly disclose to operate the heating-cooling process in a closed system.

US Patent No. 6,476,181 B1 to Alsop et al. (with a filing date of 6-1-2001) only discloses a process of **two-staged heating** can be used to increase the molecular weight of nylon 6 while **reducing its content of** caprolactam and other **volatiles** without deteriorous decomposition (abstract, line 1-3; column 3, line 22-29). Although the claimed **two heating separated by cooling may be disclosed, no step of melting is disclosed**. Additionally, Gannett does not teach or fairly disclose to operate the heating-cooling process in a closed system or it can be applied to fluorinated copolymer.

In a close examination of the **search report for this Application's priority document PCT/JP00/05674 (WO 01/14430 A1 to Imanishi et al.)**, the examiner confirms that **EP-764,668 A to Konabe, CA-1,248,292 A to Buckmaster et al., JP-8-239,420 A to Yasushi et al., and US-4,578,455 A to Pipper et al.** (all cited as A) fail to teach or fairly suggest the particular combination of limitations as **"stabilizing a melt-processable fluorine-containing copolymer"** and **"heating and melting** said copolymer and then **reheating** said copolymer with all steps **in a closed apparatus under a non-static condition"**.

9. In summary, the above-mentioned **twelve** references, in combination or alone, fail to teach or fairly suggest using the claimed process with heating-melting-cooling-heating steps to stabilize fluoropolymers.

Additionally, the present invention has shown in examples along with some comparative examples for making stable fluoropolymers having a reduced content of volatile materials (see pages 7-12 for **examples 1-2** along with its **comparative examples 3-5**). Therefore, all the above-mentioned references, in combination or alone, does not teach or fairly suggest the limitations of present invention.

10. The key issue, regarding stabilizing a melt-processable fluorine-containing copolymer by heating and melting said copolymer, disposing said copolymer in a closed apparatus, and then reheating said copolymer in said closed apparatus under non-static conditions, cannot be overcome by any or the combination of the above references, therefore, the present invention is novel.


11. As of the date of this office action, the examiner has not located or identified any reference that can be used singularly or in combination with another reference including the above references to render the present invention anticipated or obvious to one of the ordinary skill in the art. Therefore, the independent and parent **Claim 1** is allowed for the reason listed above. Since the prior art of record fails to teach the present invention, the remaining pending **Claims 2-8** are passed to issue.

12. Any inquiry concerning this communication or earlier communication from the examiner should be directed to Henry S. Hu whose telephone number is **(571) 272-1103**. The examiner can be reached on Monday through Friday from 9:00 AM –5:00 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu, can be reached on (571) 272-1114. The fax number for the organization where this application or proceeding is assigned is (703) 872-9306 for all regular communications.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Henry S. Hu

September 2, 2004


DAVID W. WU
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700